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great influence of accompanying feelings (*Mitempfindungen*). The second part is devoted to the author's investigations of the sense of temperature. Dr. Dessoir rejects Blix's point theory ; he regards the idea of two different end-apparatuses for warm and cold sensations as an unfounded assumption, and claims that the temperature sense is one mode of sensation possessing two qualities. The intensity of temperature sensations depends not only upon the *vis viva* of the heat in the stimulus, but also upon five other factors (1) the size of the surface affected, (2) the duration of the affect, (3) the thickness of the epidermis, (4) its conductibility, and (5), last not least, its temperature. κρς.

RECHERCHES D'OPTIQUE PHYSIOLOGIQUE ET PHYSIQUE. By *Clémence Royer*. Brussels Imprimerie Veuve Monnom. 1892.

The first part of this brochure consists chiefly of an examination of the theories of M. M. Hirth and Chaveau on chromatic sensation. The talented authoress disagrees with the view entertained by M. Chauveau, that the sensations of contrast which are fused cerebrally, so as to give, when viewed with both eyes, a white image, are subjective in an intellectual sense. The result is purely physico-physiological, as it is even assuming the intervention of M. Hirth's *interior eye*. Mad. Royer regards the eyes organised so as to effect a fusion of the colors and forms depicted on the two retinas, and she accepts the conclusion of M. Hirth, that they lessen the real polychromism of objects, the inability to perceive the infra-red and the ultra-violet rays concealing from us a considerable part "of the palette of nature and of its chromatic scale." The authoress refers with approval to the theory of M. Charpentier that the complementary colors correspond to inverse undulatory phases, which are destroyed by interference in the field of vision.

The second part of Mad. Royer's pamphlet is devoted to a consideration of the photography of colors, and the theory of light. It points out that the photography of colors, which has been effected to some extent by M. Lippmann, must be a physical and not a chemical process. It is the result of the periodic compressions of the sensitised silver-surface, due to the shocks it receives from the light undulations of the ether, which so modify the surfaces of the silver atoms that they reflect colored rays identical with those received from the object photographed. With reference to the propagation of light, the authoress affirms that the atoms of matter, as well as those of the ether, which differs from matter only in being imponderable and without inertia, are centres of emanation of a continuous and inpenetrable fluid, which is however indefinitely expansible or compressible. The size and form of atoms will thus depend on the compressions they receive, and they will be able to accommodate themselves to the spaces to which they are confined by the resistance of the atomic groups by which they are surrounded. But the world may be regarded as consisting of three sorts of atoms : (1) those of the ether which possess their primordial unity of expansive force and are endowed with perfect elasticity ; (2) those of ponderable matter, which have lost a portion of their expansive force and elasticity; (3) those which are called vitaliferous, because they have regained their expansive force, and are thus capable of autonomous movements necessary to resist the compressions of the ether and to oppose the inertia of matter. They thus answer to the cell-souls of Haeckel. Ω.

DIE BEWEGUNG DER LEBENDIGEN SUBSTANZ. Eine vergleichend-physiologische Untersuchung der Contractionserscheinungen. By *Max Verworn*, Dr. med., Privatdocent der Physiologie an der Universität Jena. Mit 19 Abbildungen. Jena: Gustav Fischer, 1892.

The mechanism of muscle contraction and expansion and the motions of amœboid substance have been recognised as one and the same problem ; and several naturalists, foremost among them Hofmeister, Engelmann, and Edmund Montgomery have investigated it, fully aware of the enormous importance of the subject. The present pamphlet is small, it contains only 103 pages, but it contains the statement of the problem, a description of the author's experiments, and his solution so lucidly that one cannot read it without great satisfaction. Both processes, expansion as well as contraction, are, according to Verworn, spontaneous motions, and both are to be explained by chemotropy. Expansion, i. e., in amœba the protrusion of pseudopodia, is due to the plasma's hunger for the oxygen, which is contained in the surrounding medium. Every irritation (electric shocks, concussions, injuries etc.) causes a chemical decomposition of the oxygenised plasma ; it loses carbon, hydrogen, oxygen, and nitrogen, (as we know from the waste products, carbonic acid, creatine, lactic acid,) and these substances are exactly those which are most prominent in building up living substance. Irritations without exception cause the plasma to return to the nucleus. The chemical change in the plasma makes it hungry for the nuclear substances. The vital process, accordingly, is an interaction between the nucleus, the plasma, and the medium, so that in the constant exchange of materials the old structure is preserved ; and the fundamental features of the vital process are first the plasma's chemotropy for oxygen, causing centrifugal motions, and then its chemotropy for nuclear substance, causing centripetal motions. The plasma saturated with nuclear substances, shows a chemotropy for the oxygen of the medium ; it moves in a centrifugal direction, and the oxygenised plasma has become so unstable that it breaks down on the slightest provocation. The decomposed plasma exhibits a chemotropy for nuclear substance and thus returns in contripetal motions to the centre. Without entering into details we may mention that this accounts also for the fact that dying protoplasm always assumes a globular shape, until it crumbles to pieces. The *rigor mortis* is the last vital action of living substance. The plasma seeks once more the nuclear substance, but not finding sufficient material for being built up again into a substance endowed with a chemotropy for oxygen remains rigid until it decays.

The author finds his theory to hold good for the actions of the striated and